ETERNUS DX Disk storage systems

User's Guide -Server Connection-

(iSCSI) for VMware® ESX

FUJITSU

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Preface

This manual briefly explains the operations that need to be performed by the user in order to connect an ETERNUS DX Disk storage system to a server running VMware ESX using iSCSI Software Initiator or iSCSI Hardware Initiator via an iSCSI interface.

This manual should be used in conjunction with any other applicable user manuals, such as those for the ETERNUS DX Disk storage system, server, OS, adapters, and drivers.

This manual references the following documents:

- Server Support Matrix
- ETERNUS DX Disk storage systems User's Guide -Server Connection- (iSCSI) Disk Storage System Settings (ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2)
- ETERNUS DX Disk storage systems Server Connection Guide (iSCSI) ETERNUS DX Disk Storage System Settings for ETERNUS DX60/DX60 S2, DX80
- ETERNUS DX Disk storage systems Server Connection Guide (iSCSI) ETERNUS DX Disk Storage System Settings for ETERNUS DX400/DX8000 series
- Web GUI User's Guide
- ETERNUSmgr Install Guide
- ETERNUSmgr User Guide
- Manuals supplied with the server and LAN card

This manual is designed for use with the following ETERNUS DX Disk storage systems:

- ETERNUS DX60 S2/DX80 S2/DX90 S2 Disk storage system
- ETERNUS DX410 S2/DX440 S2 Disk storage system
- ETERNUS DX8100 S2/DX8700 S2 Disk storage system
- ETERNUS DX60/DX80 Disk storage system
- ETERNUS DX410/DX440 Disk storage system
- ETERNUS DX8100/DX8400/DX8700 Disk storage system

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The Contents and Structure of this Manual

This manual is composed of the following eight chapters.

  This chapter describes how to connect the ETERNUS DX Disk storage systems to a server running VMware ESX.

  This chapter describes which servers can be connected to ETERNUS DX Disk storage systems.

  This chapter describes issues that should be noted when connecting the ETERNUS DX Disk storage systems and server.

  This chapter describes how to install ETERNUSmgr.

  This chapter describes how to use Web GUI or ETERNUSmgr to set up the ETERNUS DX Disk storage systems.

  This chapter describes how to set up the VMware ESX server.

  This chapter describes how to operate the Virtual Machine.

  This chapter describes dynamic recognition of LUNs added while VMware ESX is in use.

Acknowledgments

Naming Conventions

■ Product names

- "VMware ESX" represents the following products:
  - VMware vSphere (ESXi 5.5, ESXi 5.1, ESXi 5.0, ESX 4.1, ESXi 4.1, ESX 4.0, ESXi 4.0)
  - VMware Infrastructure 3 (ESX 3.5, ESXi 3.5)
- "Windows Server® 2003" represents the following products.
  - Microsoft® Windows Server® 2003, Standard Edition
  - Microsoft® Windows Server® 2003, Enterprise Edition
  - Microsoft® Windows Server® 2003, Standard x64 Edition
  - Microsoft® Windows Server® 2003, Enterprise x64 Edition
  - Microsoft® Windows Server® 2003 R2, Standard Edition
  - Microsoft® Windows Server® 2003 R2, Enterprise Edition
  - Microsoft® Windows Server® 2003 R2, Standard x64 Edition
  - Microsoft® Windows Server® 2003 R2, Enterprise x64 Edition
- "Linux" represents the following products.
  - Red Hat Enterprise Linux 5 (for x86)
  - Red Hat Enterprise Linux 5 (for Intel64)
  - Red Hat Enterprise Linux AS (v.4 for x86)
  - Red Hat Enterprise Linux AS (v.4 for EM64T)
  - Red Hat Enterprise Linux ES (v.4 for x86)
  - Red Hat Enterprise Linux ES (v.4 for EM64T)
  - Red Hat Enterprise Linux WS (v.4)
  - SUSE Linux Enterprise Server
  - SUSE Linux Enterprise Server 11
  - SUSE Linux Enterprise Server 11 Service Packx
  - SUSE Linux Enterprise Server 11 for x86
  - SUSE Linux Enterprise Server 11 for EM64T
  - SUSE Linux Enterprise Server 11 Service Packx for x86
  - SUSE Linux Enterprise Server 11 Service Packx for EM64T
  - SUSE Linux Enterprise Server 10
  - SUSE Linux Enterprise Server 10 Service Packx
  - SUSE Linux Enterprise Server 10 for x86
  - SUSE Linux Enterprise Server 10 for EM64T
  - SUSE Linux Enterprise Server 10 Service Packx for x86
  - SUSE Linux Enterprise Server 10 Service Packx for EM64T
  - SUSE Linux Enterprise Server 9
  - SUSE Linux Enterprise Server 9 Service Packx
  - SUSE Linux Enterprise Server 9 for x86
  - SUSE Linux Enterprise Server 9 for EM64T

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- SUSE Linux Enterprise Server 9 for x86 Service Packx
- SUSE Linux Enterprise Server 9 for EM64T Service Packx

■ Other names

- "iSCSI port" refers to the iSCSI interface module used in the ETERNUS DX Disk storage systems to connect to the server.
- "LAN card" refers to the iSCSI Software interface module normally used in the server.
- "CNA card" refers to the iSCSI Hardware interface module normally used in the server.
- "iSCSI cable" refers to the cable that is used to connect the ETERNUS DX Disk storage systems and server over an iSCSI interface.
- "VMware ESX" refers to "VMware vSphere" and "VMware Infrastructure 3", which are datacenter solutions from VMware that virtualize the storage and networking system. The name "VMware vSphere" and "VMware Infrastructure 3" are used in specific datacenter sections.
- Italics are used to show variables such as values and characters that appear in command parameters and output examples.

■ ETERNUS Disk storage system models

The following naming conventions are used to describe ETERNUS Disk storage system models in this manual.

ETERNUS Disk storage system model	Naming conventions
ETERNUS DX60 S2/DX80 S2/DX90 S2 ETERNUS DX410 S2/DX440 S2 ETERNUS DX8100 S2/DX8700 S2 ETERNUS DX60/DX80 ETERNUS DX410/DX440 ETERNUS DX8100/DX8400/DX8700	ETERNUS DX Disk storage system
ETERNUS DX60/DX80 ETERNUS DX410/DX440 ETERNUS DX8100/DX8400/DX8700	ETERNUS DX Disk storage system (excluding S2)
ETERNUS DX410 S2/DX440 S2	ETERNUS DX400 S2 series
ETERNUS DX8100 S2/DX8700 S2	ETERNUS DX8000 S2 series
ETERNUS DX410/DX440	ETERNUS DX400 series
ETERNUS DX8100/DX8400/DX8700	ETERNUS DX8000 series

Table of Contents

Chapter 1
Workflow

1.1   For the ETERNUS DX Disk storage system

This describes how to connect the ETERNUS DX Disk storage systems to a server running VMware ESX.

The workflow is shown below.

Required Documents

• Server Support Matrix

• ETERNUS DX Disk storage systems User's Guide -Server Connection- (iSCSI) Disk Storage System Settings (ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2)

• ETERNUS DX Disk storage systems Server Connection Guide (iSCSI) ETERNUS DX Disk Storage System Settings for ETERNUS DX60/DX60 S2, DX80

• ETERNUS DX Disk storage systems Server Connection Guide (iSCSI) ETERNUS DX Disk Storage System Settings for ETERNUS DX400/DX8000 series

• Web GUI User's Guide

• ETERNUSmgr Install Guide

• ETERNUSmgr User Guide

• Manuals supplied with the server and LAN card

Workflow

1

Installing ETERNUSmgr and Setting Up the ETERNUS DX Disk Storage System

If ETERNUSmgr is to be used, install it and set up the ETERNUS DX Disk storage system.

- "Chapter 4 Installing and Setting Up ETERNUSmgr" (page 18)
- "Chapter 5 Setting Up the ETERNUS DX Disk Storage System " (page 19)
- Checking the Web GUI operational procedures
  - "Web GUI User's Guide"
- Installing ETERNUSmgr
  - "ETERNUSmgr Install Guide"
- Checking the ETERNUSmgr operational procedures
  - "ETERNUSmgr User Guide"
- Setting up the ETERNUS DX Disk storage system
  - "ETERNUS DX Disk storage systems User's Guide -Server Connection- (iSCSI) Disk Storage System Settings (ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2)"
  - "ETERNUS DX Disk storage systems Server Connection Guide (iSCSI) ETERNUS DX Disk Storage System Settings for ETERNUS DX60/DX60 S2, DX80"
  - "ETERNUS DX Disk storage systems Server Connection Guide (iSCSI) ETERNUS DX Disk Storage System Settings for ETERNUS DX400/DX8000 series"

2

Setting Up the VMware ESX Server

Install the LAN card or the CNA card in the server and then set up the VMware ESX server to recognize LUNs.

- "Chapter 6 Setting Up the VMware ESX Server " (page 20)

3

Starting the Virtual Machine

Notes on Virtual Machine operation and related settings are given in this manual and other documents.

- "Chapter 7 Virtual Machine " (page 40)

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Chapter 2
Checking the Server Environment

Connection to servers is possible in the following environments.

Check the "Server Support Matrix" for server environment conditions.

2.1 Hardware

- VMware ESX connection requires the use of LAN switches.
- Access the following documents or use the "Server Support Matrix" to determine which models are compatible with which servers.
  - Search the VMware Compatibility Guide

    http://www.vmware.com/resources/compatibility/search.php

2.2 LAN Cards and CNA Cards

Refer to the "Server Support Matrix".

2.3 Connection Compatibility of ETERNUS DX Disk Storage Systems to VMware ESX

Use the following URL to determine which ETERNUS DX Disk storage system models may be connected to VMware ESX:

- Search the VMware Compatibility Guide

  http://www.vmware.com/resources/compatibility/search.php

2.4 Virtual Machine

Virtual Machine is a virtual machine created on the VMware ESX server.

Details of how to install an OS on the VMware ESX Virtual Machine may be checked via the following URL:

http://partnerweb.vmware.com/GOSIG/home.html
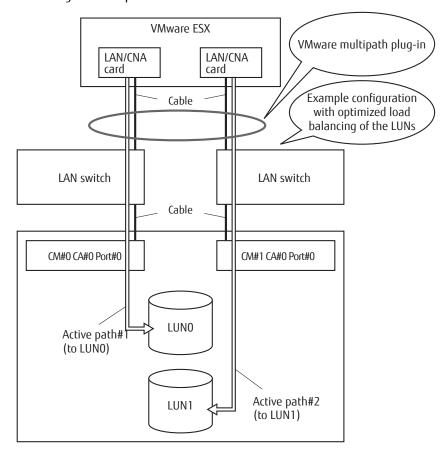
Chapter 3
Notes

Note the following issues when connecting the ETERNUS DX Disk storage system to a server.

3.1 Connection Notes

To ensure reliable access to the ETERNUS DX Disk storage systems, the following methods are recommended:

- VMware multipath plug-in
- Connection via multiple paths
- Balancing of active paths

Setting up multiple access paths between the server and the ETERNUS DX Disk storage system creates a multipath configuration. A multipath configuration provides improved access redundancy.

For VMware multipath plug-in details, refer to "3.9 VMware Multipath Plug-in " (page 17).

The recommended "Path Selection Policy" (per-LUN) setting is as follows:

- For VMware vSphere

  "RoundRobin"
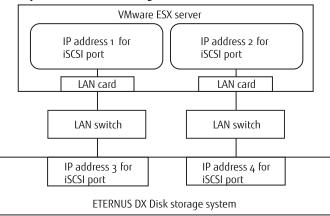
3.1.1 For VMware vSphere

Dedicated IP addresses must be allocated to the iSCSI LAN. An IP address must be allocated to each VMkernel that corresponds to an iSCSI Initiator, and a LAN card and VMkernel must be connected via a virtual switch.

● For the ETERNUS DX Disk storage system

For example, a total of four IP addresses are required by the following iSCSI connection setup.
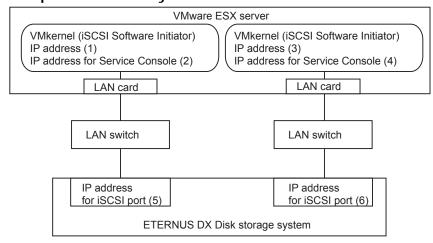
Example connection configuration

3.1.2 For VMware Infrastructure 3

Dedicated IP addresses must be allocated to the iSCSI LAN. An IP address must be allocated to each VMkernel that corresponds to an iSCSI Initiator, and a LAN card and VMkernel must be connected via a virtual switch. For example, a total of six IP addresses are required by the following iSCSI connection setup.

Example connection configuration

ETERNUS DX Disk storage systems User's Guide -Server Connection-(iSCSI) for VMware® ESX

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3.2   VMware ESX Operating Notes

- Refer to the following web-site for the number of LUNs that VMware ESX can recognize.

  http://www.vmware.com/support/pubs/

- When Windows® is used on the Virtual Machine, the registry will need to be modified after Windows® is installed. For details, refer to "Chapter 7 Virtual Machine " (page 40).

- The VMware ESX multipath function supports path failover, meaning that server access can continue unaffected by any problems that might arise in the iSCSI cables or LAN switches. It should be noted that path failover can fail to occur when multiple SCSI sense codes are repeatedly and simultaneously received.

- ETERNUS Multipath Driver and GR Multipath Driver do not need to be installed on a VMware ESX Virtual Machine. The multipath function of VMware ESX provides path redundancy.

3.3   ETERNUS DX Disk Storage System Setup Notes

- To connect a VMware ESX server to the ETERNUS DX Disk storage system, check that the firmware version matches the version specified in the "Server Support Matrix".

- Assign Affinity Group values starting from LUN0 in ascending order. The server cannot recognize the ETERNUS DX Disk storage system LUNs if some other assignment order is used.

- When LUNs are shared among multiple physical servers (in a VMotion configuration, for example), an Affinity Group mapping should be used to ensure that each shared LUN is assigned the same LUN number across every physical server.

- When connecting to VMware ESX with multiple paths sharing a single LUN, a Reset Group setting is required for the ETERNUS DX Disk storage system device.

- Details of dynamic recognition of LUNs added while VMware ESX is running are given in the "Chapter 8 Dynamic Recognition of LUNs Added While VMware ESX is in Use " (page 42).

3.4   SAN Boot Notes

The ETERNUS DX Disk storage systems do not support SAN Boot when they are connected via iSCSI Software Initiator.

3.5   Server Startup and Power Supply Control Notes
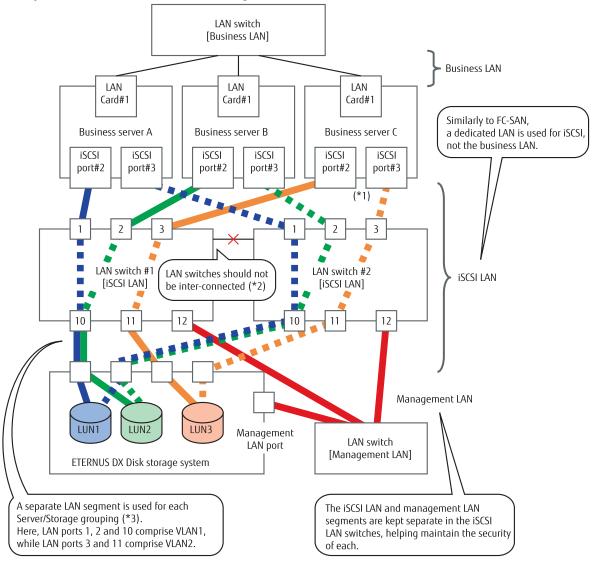
Before turning the server on, check that the ETERNUS DX Disk storage systems and LAN switches are all "Ready". Specifically, check that the Ready LED is lit for ETERNUS DX Disk storage systems. If the server is turned on and they are not "Ready", the server will not be able to recognize the ETERNUS DX Disk storage systems.

Also, when the ETERNUS DX Disk storage system power supply is being controlled by a connected server, make sure that the ETERNUS DX Disk storage system does not shut down before the connected servers. Similarly, the LAN switches must also be turned off after the connected servers have been shut down. If turned off, data writes from the running server cannot be saved to the ETERNUS DX Disk storage systems, and already saved data may also be affected.

3.6   LAN Environment Notes

- Since an iSCSI LAN handles large amounts of data (traffic volumes) like an FC-SAN, the iSCSI LAN must have its own switch and be a dedicated LAN that is separate from the business LANs.
- iSCSI LAN redundancy is achieved by the use of multipaths.
- For IP network security, separate the iSCSI LAN from the management LAN (for administration).
- The iSCSI LAN must be configured as a dedicated LAN for each path from a server to the ETERNUS DX Disk storage system.
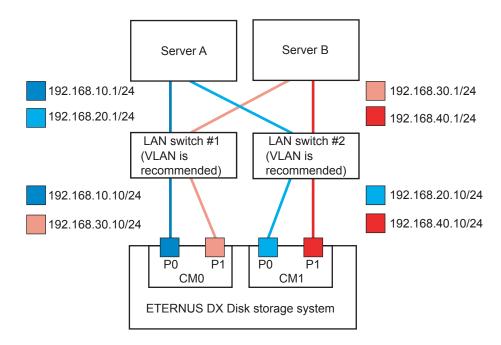
Example of a LAN switch connection configuration

LAN switch [Business LAN]

Business LAN

LAN Card#1   LAN Card#1   LAN Card#1

Business server A   Business server B   Business server C

Similarly to FC-SAN, a dedicated LAN is used for iSCSI, not the business LAN.

iSCSI port#2   iSCSI port#3   iSCSI port#2   iSCSI port#3   iSCSI port#2   iSCSI port#3

(*1)

1   2   3   1   2   3

LAN switch #1 [iSCSI LAN]   LAN switches should not be inter-connected (*2)   LAN switch #2 [iSCSI LAN]

iSCSI LAN

10   11   12   10   11   12

Management LAN

LUN1   LUN2   LUN3   Management LAN port

LAN switch [Management LAN]

ETERNUS DX Disk storage system

A separate LAN segment is used for each Server/Storage grouping (*3).
Here, LAN ports 1, 2 and 10 comprise VLAN1, while LAN ports 3 and 11 comprise VLAN2.

The iSCSI LAN and management LAN segments are kept separate in the iSCSI LAN switches, helping maintain the security of each.

*1: "iSCSI ports" indicate LAN cards and CNA cards.

*2: In this system configuration, multipaths provide redundant connections between the servers and storage system. LAN switches #1 and #2 provide physical separation of the network paths.

*3: A separate LAN segment is provided in the LAN switch (using the switch VLAN function) for each grouping of business servers and storage systems (equivalent to the FC zones).

Example of a network address configuration

The following example shows a configuration in which multiple servers are connected to multiple CAs.

| Server A | Server B |

192.168.10.1/24
192.168.20.1/24

LAN switch #1 (VLAN is recommended)   LAN switch #2 (VLAN is recommended)

192.168.30.1/24
192.168.40.1/24

192.168.10.10/24
192.168.30.10/24

192.168.20.10/24
192.168.40.10/24

P0   P1   P0   P1
CM0   CM1

ETERNUS DX Disk storage system

The following example shows a configuration in which a single server is connected to multiple CAs.

Server

192.168.10.1/24   192.168.20.1/24

LAN switch #1   LAN switch #2

192.168.10.10/24   192.168.10.11/24
192.168.20.10/24   192.168.20.11/24

P0   P1   P0   P1
CM0   CM1

ETERNUS DX Disk storage system

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3.7　Jumbo Frame Setting Notes

- To enable Jumbo Frame, all the connected devices must support Jumbo Frame. Set the appropriate values for various parameters (such as the MTU size) on each connected device.
- For details about how to set Jumbo Frame for a LAN card and LAN switch, refer to the VMware ESX manuals and each device's manuals. Rebooting the server may be required to apply the new settings.
- The MTU size that is supported by the ETERNUS DX60/DX60 S2, DX80/DX80 S2, DX90 S2, ETERNUS DX400 S2 series, and ETERNUS DX8000 S2 series is 9000 bytes.

3.8　LAN Switch Setting Notes

When using a LAN switch that supports the flow control function, disable the flow control function according to the following notes:

- For access paths that use iSCSI, disable the flow control function on the sending and receiving ends of the port.
- When a cascade connection is used to connect to LAN switches, disable the function for the LAN switch that is directly connected to the ETERNUS DX Disk storage system.

For details on how to set the flow control function of the LAN switch, refer to the LAN switch manual.

3.9　VMware Multipath Plug-in

For improved system reliability, installing the VMware multipath plug-in for the ETERNUS DX Disk storage system is recommended. The VMware multipath plug-in for the ETERNUS DX Disk storage system can prevent access from being stopped when a path fails by optimizing the VMware multipath's path fail-over function for the ETERNUS DX Disk storage system. For setting details, refer to .

For details on how to obtain VMware Multi-Pathing plug-in for ETERNUS, contact your sales representative.

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Chapter 4
Installing and Setting Up ETERNUSmgr

If ETERNUSmgr is to be used, install it according to the directions given in the "ETERNUSmgr Install Guide". After installation is complete, follow the instructions in "ETERNUSmgr User Guide" and set up ETERNUSmgr.

Chapter 5
Setting Up the ETERNUS DX Disk Storage System

Set up the ETERNUS DX Disk storage systems using Web GUI or ETERNUSmgr.

ETERNUS DX Disk storage system setup can be performed independently of server setup. For details on how to perform these settings, refer to the following manuals.

- "ETERNUS DX Disk storage systems User's Guide -Server Connection- (iSCSI) Disk Storage System Settings (ETERNUS DX80 S2/DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2)"
- "ETERNUS DX Disk storage systems Server Connection Guide (iSCSI) ETERNUS DX Disk Storage System Settings for ETERNUS DX60/DX60 S2, DX80"
- "ETERNUS DX Disk storage systems Server Connection Guide (iSCSI) ETERNUS DX Disk Storage System Settings for ETERNUS DX400/DX8000 series"
- "Web GUI User's Guide" or "ETERNUSmgr User Guide"

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Chapter 6
Setting Up the VMware ESX Server

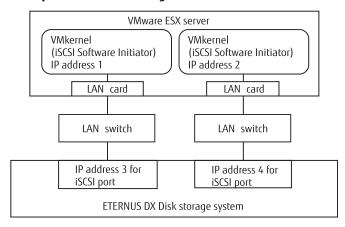This chapter describes settings related to the server iSCSI interface.

6.1　When VMware vSphere is used (with iSCSI Software Initiator)

Set up the VMware ESX server using the vSphere Client. The procedures described here are based on the following multipath configuration.

● For the ETERNUS DX Disk storage system

For example, a total of four IP addresses are required by the following iSCSI connection setup.

Example connection configuration

```
                        VMware ESX server
  ┌──────────────────────────────────────────────────────┐
  │  ┌──────────────────────┐  ┌──────────────────────┐   │
  │  │ VMkernel             │  │ VMkernel             │   │
  │  │ (iSCSI Software      │  │ (iSCSI Software      │   │
  │  │  Initiator)          │  │  Initiator)          │   │
  │  │ IP address 1         │  │ IP address 2         │   │
  │  └──────────────────────┘  └──────────────────────┘   │
  │     ┌──────────────┐          ┌──────────────┐        │
  │     │  LAN  card   │          │  LAN  card   │        │
  │     └──────────────┘          └──────────────┘        │
  └──────────────────────────────────────────────────────┘
           │                              │
      ┌──────────────┐          ┌──────────────┐
      │  LAN  switch │          │  LAN  switch │
      └──────────────┘          └──────────────┘
           │                              │
  ┌──────────────────────────────────────────────────────┐
  │  ┌──────────────────┐    ┌──────────────────┐         │
  │  │ IP address 3 for │    │ IP address 4 for │         │
  │  │ iSCSI port       │    │ iSCSI port       │         │
  │  └──────────────────┘    └──────────────────┘         │
  │          ETERNUS DX Disk storage system               │
  └──────────────────────────────────────────────────────┘
```

6.1.1　Turning on the Devices

To turn on the connected devices, use the following procedures:

Procedure

1　Turn on the LAN switch power.

2　Check that the LAN switch's Ready (or equivalent) LED is lit.

3　Turn on the ETERNUS DX Disk storage system.

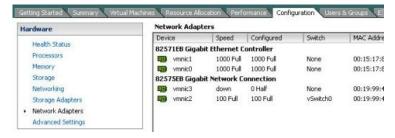4　Check that the Ready LED is lit on the ETERNUS DX Disk storage system.

5   Turn on the server.

End of procedure

6.1.2   Checking the LAN Cards

Procedure

1   Log in to VMware ESX from the vSphere Client and select the [Configuration] tab.

2   Click [Network Adapters] in the [Hardware] list.
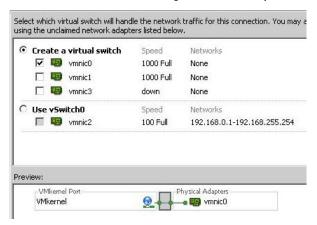"vmnic0" and "vmnic1" in the following example.

End of procedure

6.1.3   Creating the Virtual Switches

Add two virtual switches (vSwitch) for iSCSI to VMware ESX. Add a "VMkernel" and "vmnic" for each vSwitch.
Perform the following procedure to each vmnic that configures iSCSI SAN.
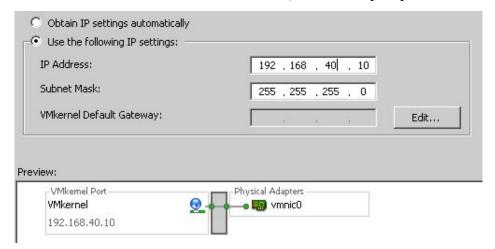
Procedure

1   Open the network window by selecting the [Configuration] tab on vSphere Client and click [Add Network] in the upper right of the window.
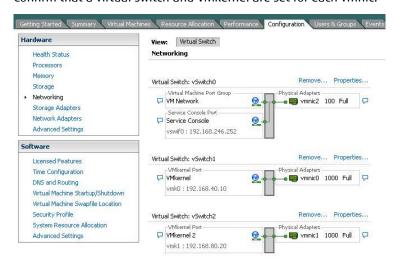
2   Select [VMkernel] and click the [Next] button.

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3 Select the checkbox of the target network adapter and click the [Next] button.

4 Set properties of port groups as required, and click the [Next] button.

5 Set the IP address and subnet mask of "VMkernel", and click the [Next] button.

6 Repeat Step 1 through Step 5 to add another virtual switch (vSwitch2).

7 Confirm that a virtual switch and VMkernel are set for each vmnic.
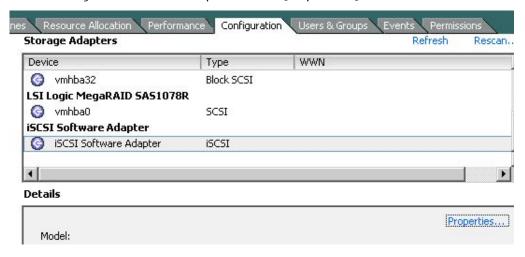

End of procedure

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6.1.4   Setting the Software Initiator

Enable Software Initiator in VMware ESX.

6.1.4.1   For the ETERNUS DX Disk storage system

Procedure

1   Select the [Configuration] tab on vSphere Client and click [Storage Adapters].

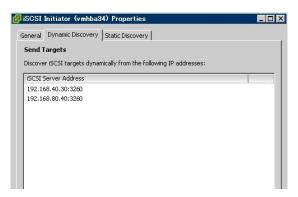2   Select the target iSCSI Software Adapter and click [Properties...].

3   Click [Configure] on the [General] tab.

4   Select the [Status-Enabled] checkbox and click the [OK] button.

5   Confirm that the [Enabled] checkbox is selected under "Status" on the [General] tab and click [Config-ure] again.

6   Confirm that the iSCSI name is displayed in the "iSCSI Name" column and click the [Cancel] button.

7   Select the [Dynamic Discovery] tab and click the [Add] button.

8   Enter the IP address for the iSCSI port of the connected ETERNUS DX Disk storage system as the iSCSI server IP address, confirm that the port is set to "3260" (default), and click the [OK] button.

9   Confirm that the IP address for the iSCSI port of the ETERNUS DX Disk storage system is displayed as follows.

10   If the connected ETERNUS DX Disk storage system uses multiple iSCSI ports, repeat the IP address addition process for each iSCSI port. (Repeat Step 7 through Step 9.)

End of procedure

6.1.5   Enabling ALUA

IMPORTANT

This procedure is only required when VMware vSphere contains VMware ESX 4.0/VMware ESXi 4.0.

It does not need to be performed when VMware vSphere contains VMware ESX 4.0 Update 1/VMware ESXi 4.0 Update 1 or later versions.

In this case, proceed to "6.1.6 Checking the LUNs" (page 26).

After the VMware ESX server has been installed, Asymmetric Logical Unit Access (ALUA) should be enabled according to the following procedure.

Procedure

1   Use the terminal to log in to VMware ESX as "root".

2   Execute the following command in the terminal:
  • When connecting to an ETERNUS DX60/DX60 S2, DX80/DX80 S2, or DX90 S2

```
esxcli nmp satp addrule --satp="VMW_SATP_ALUA" --vendor="FUJITSU" --
model="ETERNUS_DXL" --description="ETERNUS DX with ALUA" --claim-option
tpgs_on
```

  • When connecting to an ETERNUS DX400/DX400 S2 series

```
esxcli nmp satp addrule --satp="VMW_SATP_ALUA" --vendor="FUJITSU" --
model="ETERNUS_DX400" --description="ETERNUS DX400 with ALUA" --
claim-option tpgs_on
```

- When connecting to an ETERNUS DX8000/DX8000 S2 series

```
esxcli nmp satp addrule --satp="VMW_SATP_ALUA" --vendor="FUJITSU" --
model="ETERNUS_DX8000" --description="ETERNUS DX8000 with ALUA"
--claim-option tpgs_on
```

3   Execute the following command in the terminal:

```
esxcli corestorage claiming unclaim --type location
```

> ▷ **Caution**

Ignore the following error message if it appears when the preceding command is executed:

```
Errors:
Unable to perform unclaim. Error message was : Unable to
unclaim paths. Busy or in use devices detected. See
VMkernel logs for more information.
```

4   Execute the following command in the terminal:

```
esxcli corestorage claimrule run
```

5   Check that the connected ETERNUS DX Disk storage system is shown when the appropriate command is executed in the terminal:

Command

```
esxcli nmp satp listrules --satp VMW_SATP_ALUA
```

Display result

- When connecting to an ETERNUS DX60/DX60 S2, DX80/DX80 S2, or DX90 S2

```
VMW_SATP_ALUA FUJITSU ETERNUS_DXL tpgs_on ETERNUS_DXL with ALUA
```

- When connecting to an ETERNUS DX400/DX400 S2 series

```
VMW_SATP_ALUA FUJITSU ETERNUS_DX400 tpgs_on ETERNUS_DX400 with ALUA
```

- When connecting to an ETERNUS DX8000/DX8000 S2 series

```
VMW_SATP_ALUA FUJITSU ETERNUS_DX8000 tpgs_on ETERNUS_DX8000 with ALUA
```

6   Log out of the terminal, and restart the VMware ESX server.

End of procedure

Refer to the following for details of the above commands:

- Reference URL:

  http://www.vmware.com/support/pubs/

- Reference documents:

  "vSphere Command-Line Interface Concepts and Examples"

6.1.6   Checking the LUNs

The following procedure describes how to check LUN recognition using the vSphere Client.

Log in to the VMware ESX from the vSphere Client, and then check whether the ETERNUS DX Disk storage system LUNs are recognized.
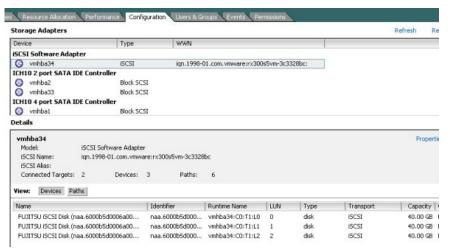
The procedure is as follows:

Procedure

1   Use the vSphere Client to log in to VMware ESX as "root".

2   Select the [Configuration] tab.

3   Select [Storage Adapters] from the [Hardware] list.
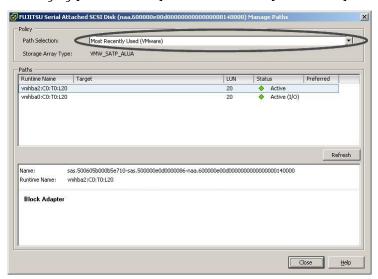
4   Select [Rescan...].

> **Note**
>
> After selecting [Rescan...], the VMware ESX should attempt to recognize the ETERNUS DX Disk storage systems' LUNs again.

5   If the iSCSI Software Adapter (vmhba34 in this example) is selected from the [Storage Adapters] area, the recognized devices will be shown in the [Details] area, as follows.

6   Check the [Path Selection] for all the LUNs in the ETERNUS DX Disk storage system.

When the VMware ESX server recognizes the LUNs, the active path for each LUN is automatically set. In this case, [Path Selection] is set to [Most Recently Used (VMware)].

• For the ETERNUS DX Disk storage system

Changing [Path Selection] for all the LUNs to [RoundRobin] is recommended.
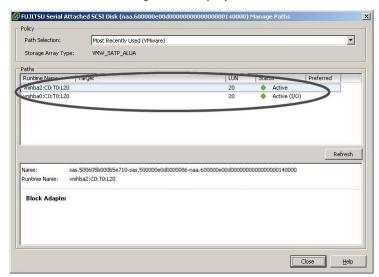

Refer to the following for details of the above commands:

URL: http://www.vmware.com/support/pubs/

Guide: "vSphere Command-Line Interface Concepts and Examples"

7   For a multipath configuration, confirm that the paths of all the LUNs in the ETERNUS DX Disk storage system are configured with multipath. When paths for a LUN are configured with multipath, multiple Runtime Names and Targets are displayed in [Paths].

End of procedure
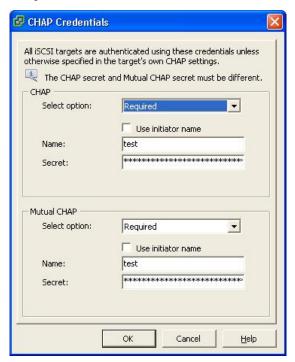
6.1.7   Setting CHAP Authentication

CHAP and mutual CHAP authentication can be set for VMware ESX connections.

Log in to VMware ESX from the vSphere Client, check whether the ETERNUS DX Disk storage system LUNs have been recognized, and then enable the CHAP authentication.

The procedure is as follows:

Procedure

1   Select the [Configuration] tab on vSphere Client and select [Storage Adapters].

2   Select the target iSCSI Software Adapter and click [Properties].

3   Select the [General] tab and click [CHAP].

4   Set CHAP.
   - When setting CHAP only

     Select [Required] for [Select option:] under "CHAP" and set the [Name:] and [Secret:].
   - When setting CHAP and mutual CHAP

     Select [Required] for [Select option:] under "CHAP" and "Mutual CHAP" and set the [Name:] and [Secret:].

End of procedure

6.1.8   Plug-in Settings

Set up VMware Multi-Pathing plug-in for ETERNUS by following "Software Information", which is a manual that is provided with the VMware Multi-Pathing plug-in for ETERNUS.
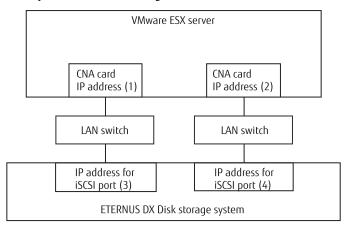
6.2 When VMware vSphere is used (with iSCSI Hardware Initiator)

Set up the VMware ESX server using the vSphere Client. The procedures described here are based on the following multipath configuration.

● For ETERNUS DX Disk Storage Systems

For example, a total of four IP addresses are required by the following iSCSI connection setup.

Example connection configuration

6.2.1 CNA Card Settings (for the ETERNUS DX Disk Storage System)

Install the CNA cards in the server, acquire the iSCSI name, set the IP address for the CNA cards, and set the iSCSI name and the IP address of the target.

> ▶ **Caution**

For details on the setting procedure for the CNA cards that are used for iSCSI Hardware Initiator, refer to the CNA card manual.

The workflow is shown below.

    (1) Install the CNA card

    (2) Turn on the server

    (3) Acquire iSCSI name for the CNA card

    (4) Set IP address for the CNA card

    (5) Set iSCSI name and IP address for the target

A setting example for the PY-CN202 (Emulex bland OCe10102-FM) is shown below.

> ▶ **Caution**

For details on PY-CN202 (Emulex OCe10102-FM) settings, refer to the CNA card manuals.

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Procedure

1   Install the CNA card in the server.

For the installation method, slot positions and notes regarding the CNA card, refer to the manual provided with the CNA card or the user guide of the server.

2   Turn on the server, and press the [Ctrl] + [S] keys while the following message is displayed.

```
Emulex 10Gb iSCSI Initiator BIOS v4.6.142.10
(c) 2005-2013 Emulex Corporation. All Rights Reserved.
(c) 1998-2005 Adaptec, Inc. All Rights Reserved.

<<< Press <Ctrl><S> for iSCSISelect(TM) Utility >>>
```

Emulex iSCSISelect Utility starts.

3   Acquire the iSCSI Initiator Name in the iSCSI Initiator Configuration screen.

Select [Save] and press the [Enter] key to save the iSCSI Initiator Name.

4   Select [Controller Configuration], select the CNA card port for which the information is set in the Controller Select Menu screen, and press the [Enter] key.

5   Select [Network Configuration > Configure Static IP Address] from the Controller Configuration menu and set IP address in the Static IP Address screen.

6   Select [iSCSI Target Configuration] from the Controller Configuration menu, open the Add/Ping iSCSI Target screen from [Add New iSCSI Target], and set the information to add a target.

The information listed below is necessary:

- iSCSI name of the target
- IP address of the target
- Whether the CHAP authentication is enabled (one-way CHAP, Mutal CHAP, none)

End of procedure

6.2.2   Checking the LUNs

The following procedure describes how to check LUN recognition using the vSphere Client.

Log in to the VMware ESX from the vSphere Client, and then check whether the ETERNUS DX Disk storage system LUNs are recognized.
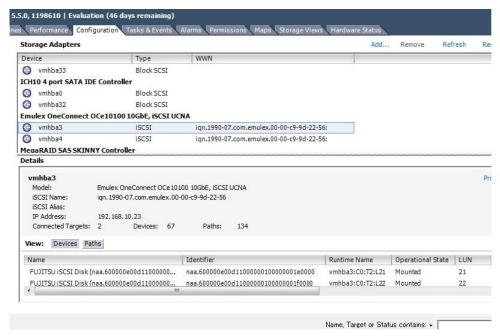
The procedure is as follows:

Procedure

1   Use the vSphere Client to log in to VMware ESX as "root".

2   Select the [Configuration] tab.

3   Select [Storage Adapters] from the [Hardware] list.

4   Select [Rescan...].

> ● **N o t e**
>
> After selecting [Rescan...], the VMware ESX should attempt to recognize the ETERNUS DX Disk stor-
> age systems' LUNs again.

5   If the iSCSI Hardware Adapter (vmhba3 and vmhba4 in this example) is selected from the [Storage
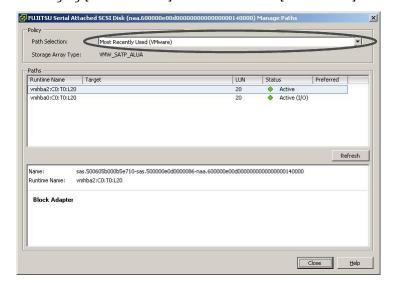Adapters] area, the recognized devices will be shown in the [Details] area, as follows.

6   Check the [Path Selection] for all the LUNs in the ETERNUS DX Disk storage system.

When the VMware ESX server recognizes the LUNs, the active path for each LUN is automatically set. In
this case, [Path Selection] is set to [Most Recently Used (VMware)].

• For ETERNUS DX Disk storage systems

Changing [Path Selection] for all the LUNs to [RoundRobin] is recommended.

ETERNUS DX Disk storage systems User's Guide -Server Connection-(iSCSI) for VMware® ESX
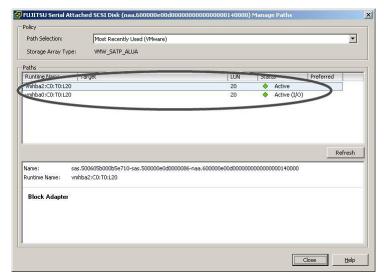
Copyright 2013 FUJITSU LIMITED

Refer to the following for details of the above commands:

URL: http://www.vmware.com/support/pubs/

Guide: "vSphere Command-Line Interface Concepts and Examples"

7   For a multipath configuration, confirm that the paths of all the LUNs in the ETERNUS DX Disk storage system are configured with multipath. When paths for a LUN are configured with multipath, multiple Runtime Names and Targets are displayed in [Paths].

End of procedure

6.2.3   Setting CHAP Authentication

Perform the CHAP authentication settings in Step 6 of "6.2.1 CNA Card Settings (for the ETERNUS DX Disk Storage System)" (page 29).

For details on this setting procedure, refer to the relevant manuals (such as the Boot Code User Manual) at the following Emulex website:

http://www.emulex.com/downloads/emulex/

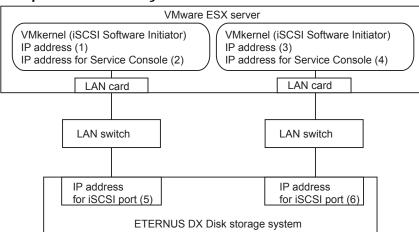## 6.2.4   Setting Up SAN Boot Authentication

For the SAN Boot setting procedure, refer to the relevant manuals (such as the Boot Code User Manual) at the following Emulex website:

http://www.emulex.com/downloads/emulex/

6.3   For VMware Infrastructure 3

Set up the VMware ESX server using the VMware Infrastructure Client. The procedures described here are based on the following multipath configuration.

Example connection configuration

```
                       VMware ESX server
┌─────────────────────────────────────────────────────────────────┐
│ ╭──────────────────────────────╮  ╭──────────────────────────────╮ │
│ │ VMkernel (iSCSI Software      │  │ VMkernel (iSCSI Software      │ │
│ │ Initiator)                    │  │ Initiator)                    │ │
│ │ IP address (1)                │  │ IP address (3)                │ │
│ │ IP address for Service        │  │ IP address for Service        │ │
│ │ Console (2)                   │  │ Console (4)                   │ │
│ ╰──────────────────────────────╯  ╰──────────────────────────────╯ │
│       ┌─────────────┐                  ┌─────────────┐              │
│       │  LAN card   │                  │  LAN card   │              │
│       └─────────────┘                  └─────────────┘              │
└─────────────────────────────────────────────────────────────────┘
              │                                │
       ┌─────────────┐                  ┌─────────────┐
       │ LAN switch  │                  │ LAN switch  │
       └─────────────┘                  └─────────────┘
              │                                │
┌─────────────────────────────────────────────────────────────────┐
│   ┌─────────────┐                  ┌─────────────┐                │
│   │ IP address  │                  │ IP address  │                │
│   │ for iSCSI   │                  │ for iSCSI   │                │
│   │ port (5)    │                  │ port (6)    │                │
│   └─────────────┘                  └─────────────┘                │
│               ETERNUS DX Disk storage system                      │
└─────────────────────────────────────────────────────────────────┘
```

6.3.1   Turning on the Devices

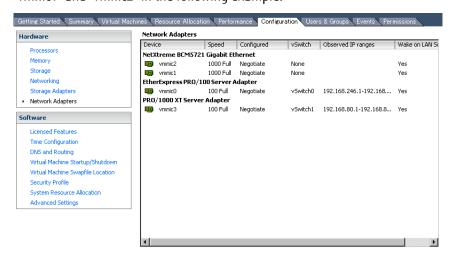To turn on the connected devices, use the following procedures:

Procedure

1   Turn on the LAN switch power.

2   Check that the LAN switch's Ready (or equivalent) LED is lit.

3   Turn on the ETERNUS DX Disk storage system.

4   Check that the Ready LED is lit on the ETERNUS DX Disk storage system.

5   Turn on the server.

End of procedure

6.3.2   Checking the LAN Cards

Procedure

1   Select the [Configuration] tab on VMware Infrastructure Client.

2   Check the iSCSI SAN configuration Network Adapters.
    "vmnic1" and "vmnic2" in the following example.

End of procedure

6.3.3   Creating the Virtual Switches

Add two virtual switches (vSwitch) for iSCSI to VMware ESX.
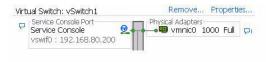Define two virtual network port types ("Service Console" and "VMkernel") for the added vSwitch.
Also assign IP addresses on the same subnet to the defined Service Console and VMkernel.

6.3.3.1   Adding a Service Console

Procedure

1   Select the [Configuration] tab on VMware Infrastructure Client and click [Add Networking].

2   Select [Service Console] and click the [Next] button.

3   Select the checkbox of the target network adapter and click the [Next] button.

4   Check the [Service Console] details, set an arbitrary VLAN ID, IP address, and subnet mask, and click the [Next] button.

5　　Check the [Service Console] IP address and click the [Finish] button.

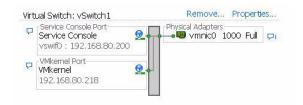Confirm that the virtual switch (vSwitch1) has been created as follows.

6　　Repeat Step 1 through Step 5 to add Service Console to vSwitch2.

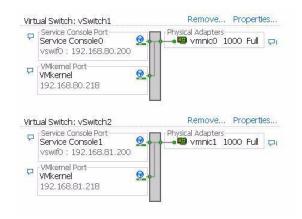**End of procedure**

6.3.3.2　　Adding a VMkernel

Procedure

1　　Select the [Configuration] tab on VMware Infrastructure Client and select the target virtual switch' s [Properties].

2　　Click [Add].

3　　Select the [VMkernel] radio button, and click the [Next] button.

4　　Confirm that the VMkernel is displayed, set the IP address (an optional VLAN ID may be set, as necessary), and click the [Next] button.

5　　Confirm the settings shown on the confirmation screen and click the [Finish] button.

A message about Gateway settings appears.

6　　Perform any further settings as necessary and click the [Close] button.

The VMkernel has been added to the target vSwitch.

7　　Repeat Step 1 through Step 6 to add VMkernel to another vSwitch.

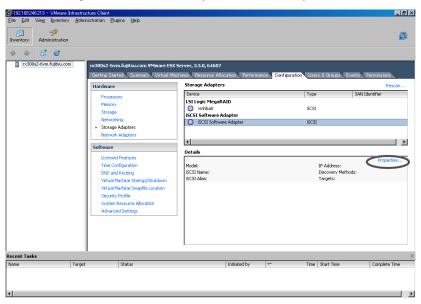8   Confirm that a virtual switch and VMkernel are set for each vmnic.

End of procedure

6.3.4   Setting the Software Initiator
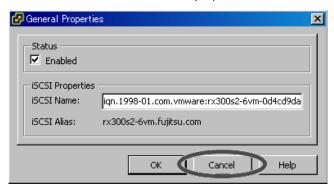
Enable Software Initiator in VMware ESX.

Procedure

1   Select the [Configuration] tab on VMware Infrastructure Client and click [Storage Adapters].

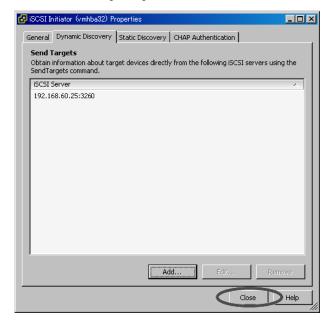2   Select the target iSCSI Software Adapter and click [Properties].

3   Click [Configure] on the [General] tab.

4   Select the [Status-Enabled] checkbox and click the [OK] button.

5   Confirm that the [Enabled] checkbox is selected under "Status" on the [General] tab and click [Config-ure] again.

6   Confirm that the iSCSI name is displayed as follows and click the [Cancel] button.

7   Select the [Dynamic Discovery] tab and click the [Add] button.

8   Enter the IP address for the iSCSI port of the connected ETERNUS DX Disk storage system as the iSCSI Server IP address, confirm that the port is set to "3260" (default), and click the [OK] button.

9   Confirm that the IP address for the iSCSI port of the ETERNUS DX Disk storage system is displayed as follows and click [Close].

10   If the connected ETERNUS DX Disk storage system uses multiple iSCSI ports, repeat the IP address addition process for each iSCSI port. (Repeat Step 7 through Step 9.)

End of procedure

6.3.5   Setting CHAP Authentication

For VMware ESX connections, the ETERNUS DX Disk storage system uses a one-way CHAP authentication to authenticate the Software Initiator access.
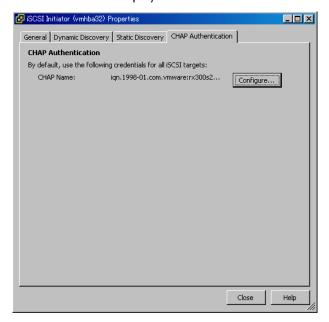
Perform the following settings to enable CHAP authentication.

Procedure

1   Select the [Configuration] tab on VMware Infrastructure Client and select [Storage Adapters].

2   Select the target iSCSI Software Adapter and click [Properties].

3   Select the [CHAP Authentication] tab and click [Configure].

4   Select the [Use the following CHAP credentials] radio button.

5   Set arbitrary user name during the CHAP authentication.

6   To set the VMware ESX iSCSI name for the user name, select the [Use initiator name] checkbox.

7   Enter the password in [CHAP Secret] and click the [OK] button.
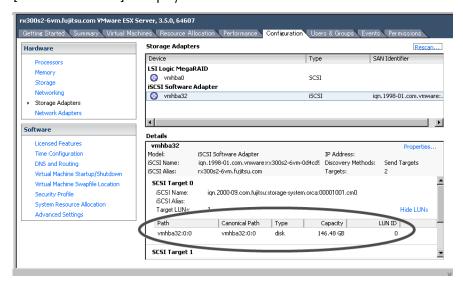   The CHAP Name is displayed as follows.

End of procedure

6.3.6   Checking the LUNs

The VMware Infrastructure Client is used to login to VMware ESX and check the LUNs.

Procedure

1   Select the [Configuration] tab on VMware Infrastructure Client, and select the target iSCSI Adapter.

2   Click [Rescan...].

The LUNs are displayed under the SCSI Target 0 in the "Details" field. In this example, [Path:vmhba32:0:0] is displayed as follows:

> ▶ **Caution**
>
> If LUNs are added while VMware ESX is running (LUNs are recognized dynamically), added LUNs should be recognized by performing the VMware Infrastructure Client "Rescan" operation after the LUN has been added to an Affinity Group.

3   Check the multipath. Right-click the [Path:vmhba32:0:0] described in Step 2, and select "Manage Paths".

When paths are configured with multipath, multiple paths are displayed in the "Path" field.

End of procedure

Chapter 7
Virtual Machine

This chapter describes the notes on the Virtual Machine and its settings.

To configure the Virtual Machine, access the following web-site and check the "Guest Operation System Installation Guide".

- Guest Operation System Installation Guide

  http://partnerweb.vmware.com/GOSIG/home.html

7.1 For Windows®

7.1.1 Checking the Registry Information

Check the value of the "TimeOutValue" registry key. If the "TimeOutValue" registry key does not exist, then create it.

The registry file should be backed up before creating or changing any registry values.

Procedure

1 Click the [Start] button, and then click [Run].

2 In the [Run] dialog box, type "regedit", and then click the [OK] button.
Registry Editor starts.

3 Follow the path described below:

```
\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Disk
```

4 Check the value of the "TimeOutValue" registry key.

Check that the value of the "TimeOutValue" registry key is "0x3C". If the name or value is not "0x3C", change it to "0x3C".

> ▶ **Caution**

- If the "TimeOutValue" key does not exist, add a registry key with the following values:
- The "Name" field is case-sensitive.

Name	TimeOutValue
Type	REG_DWORD
Radix	Hexadecimal
Data	3C

5   If any registry values were added or modified, reboot the server. The modified settings will be enabled after the reboot.

End of procedure

7.1.2   Applying Required Patches

Patches provided by Microsoft® are necessary for Windows Server® 2003 with Service Pack 1 applied and Windows Server® 2003 R2.

Refer to VMware KB 2267 on the VMware web-site or check with Microsoft® for patch details.

7.2   For Linux

7.2.1   Applying Required Patches

This section describes notes for applying Virtual machine update.

For the following OSes, the Virtual Machine file system may be restricted to being read-only:

If this is a problem, refer to "VMware KB Article 51306" on the VMware web-site for details, and patch the Virtual Machine as required.

- Red Hat Enterprise Linux 5
- Red Hat Enterprise Linux AS v.4 Update 4
- Red Hat Enterprise Linux AS v.4 Update 3
- SUSE Linux Enterprise Server 10
- SUSE Linux Enterprise Server 9 Service Pack 3

Chapter 8
Dynamic Recognition of LUNs Added While VMware ESX is in Use

When adding LUNs while VMware ESX is in use (recognizing LUNs dynamically), first assign the added volumes to an ETERNUS DX Disk storage system Host Affinity Group, and then LUNs should be recognized with the "Rescan" operation via the VMware Infrastructure Client (Infrastructure 3) or vSphere Client, respectively described in "6.1 When VMware vSphere is used (with iSCSI Software Initiator)" (page 20) and "6.3 For VMware Infrastructure 3 " (page 33).

ETERNUS DX Disk storage systems User's Guide -Server Connection-
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